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(56) Documents Cited

**GB 2322511 A WO 98/27706 A1**

(58) Field of Search

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INT CL<sup>6</sup> **H04M 1/274**

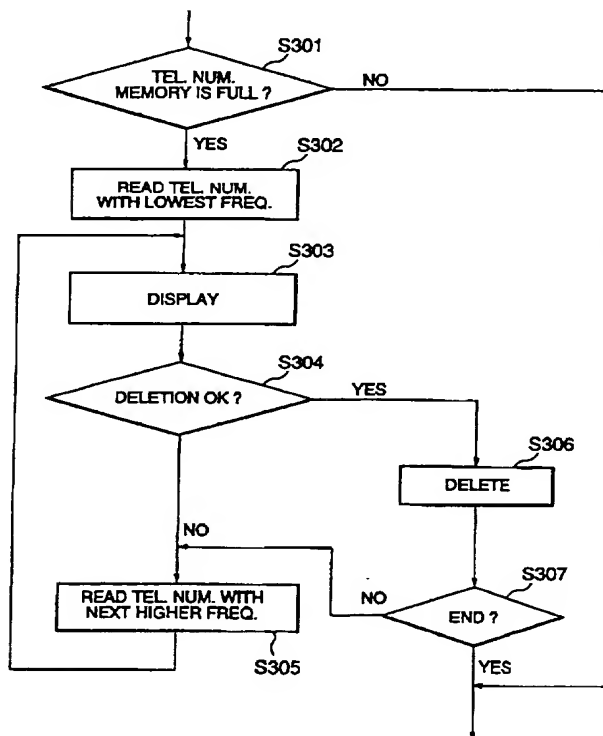
On-Line - **EPODOC, JAPIO, WPI**

(54) Abstract Title

**Overwriting least frequently used numbers in a telephone memory**

(57) In a mobile telephone, a plurality of telephone numbers and use frequency of each telephone number are stored in a telephone number memory. When the memory is full, a telephone number with the lowest use frequency is displayed to be checked whether it should be deleted. Therefore the user can easily delete it with safety to achieve the efficient use of the memory.

FIG. 3



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FIG. 1

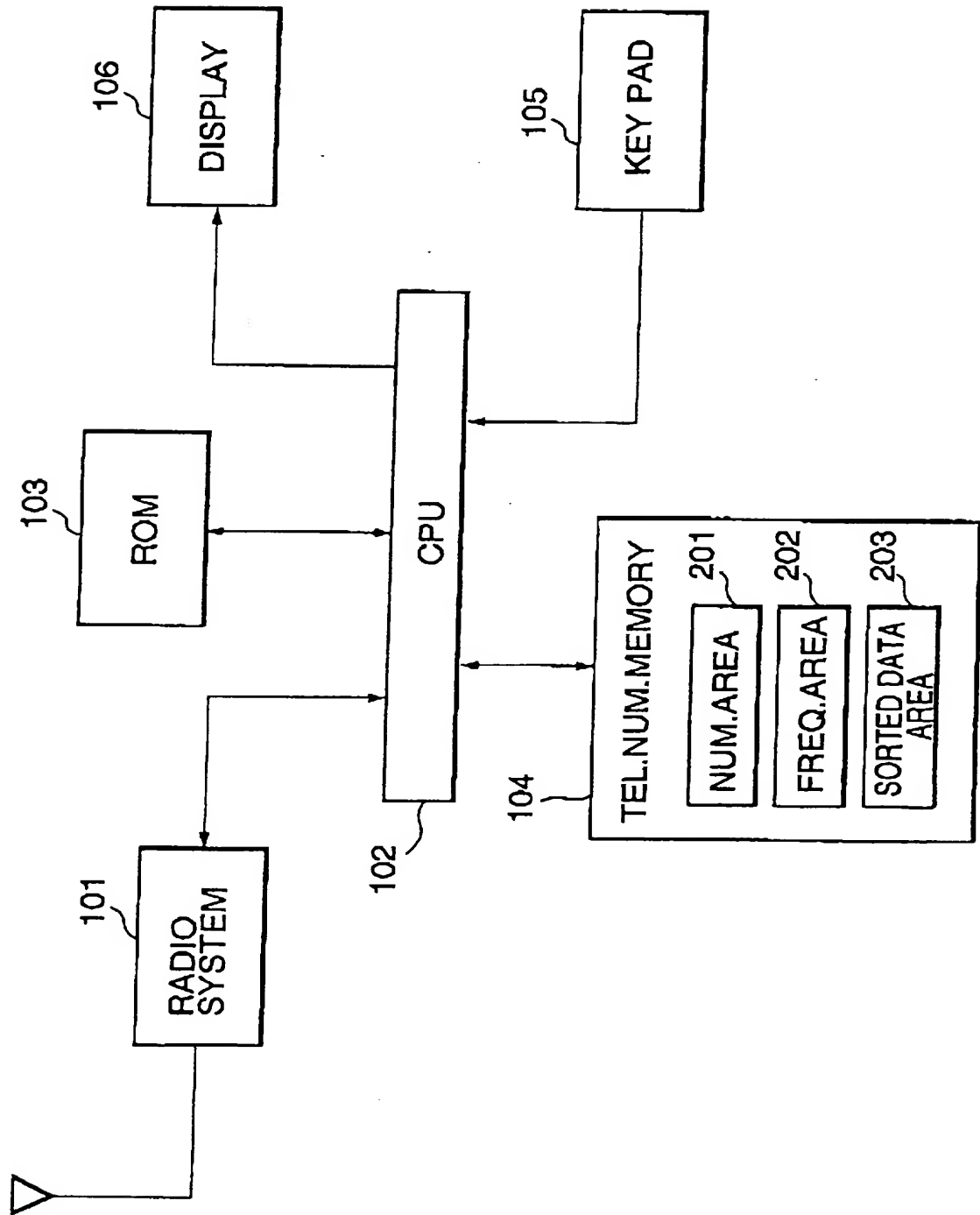


FIG. 2A

REF.	201	0	JOHN
		1	2 3 4 5 6 7 8 9 0
		1	SUPER JOHN
		0	9 8 7 6 5 4 3 2 1
		2	ULTRA JOHN
499	PEACH BOY	5	7 5 7 5 7 5 7
		1	1 1 1 1 1 1 1 1 1

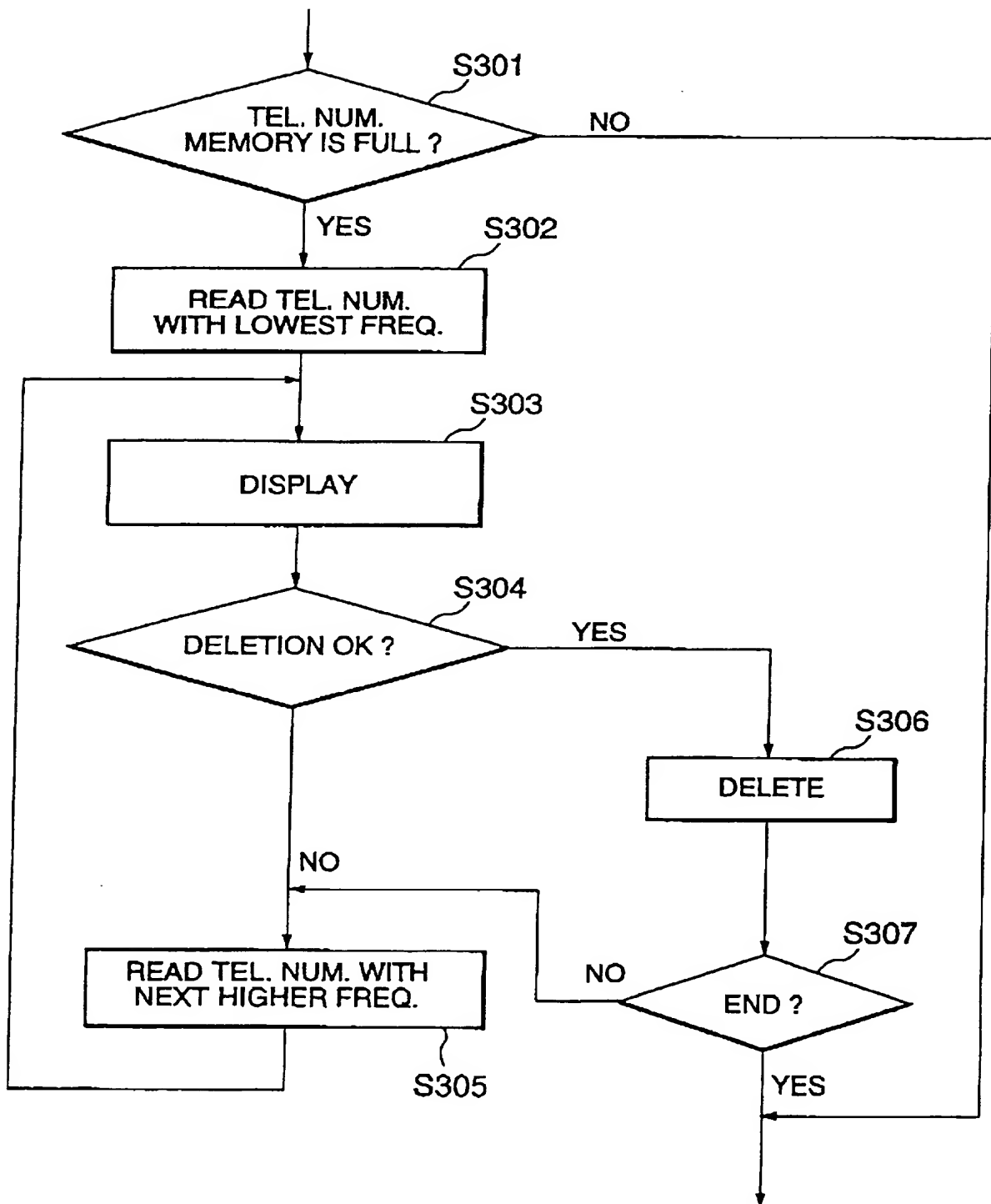
FIG. 2B

REF.	202	0	5
		1	2
		2	0
499	20		

FIG. 2C

REF.	203	0	499
		1	0
		2	1
499	2		

FIG. 3



## MOBILE TELEPHONE AND CONTROL METHOD THEREFOR

## BACKGROUND OF THE INVENTION

## 1. Field of the invention

The present invention generally relates to a mobile telephone with a memory storing dialing information, and in particular to a mobile telephone having a function of managing dialing information stored in the memory.

## 2. Description of the Related Art

A mobile telephone having an automatic dialing function with stored telephone numbers has been widely used. A plurality of telephone numbers is usually stored onto a telephone number memory until it becomes full. However, when the telephone number memory reaches capacity, it is necessary to delete an unnecessary telephone number from the telephone number memory so as to store a new telephone number thereto.

When a telephone number is deleted, it is necessary to display the telephone number on screen so that the user can check it. As a method of checking a telephone number before dialing, there has been disclosed a number displaying method of displaying telephone numbers in decreasing order of frequency on screen in Japanese Patent Unexamined Publication Nos. 7-336426, 4-144345,

and 8-9014.

### SUMMARY OF THE INVENTION

An object of the present invention is to provide a mobile telephone which can easily delete an unnecessary telephone number  
5 with safety.

According to the present invention, a mobile telephone includes a display, a memory for storing a plurality of telephone numbers and frequency of use of each of the telephone numbers, and a controller for controlling  
10 the display such that, when the memory is full, a telephone number with lowest use frequency is displayed on the display.

When there is not enough memory to store a new telephone number onto the memory, the telephone number with the lowest use frequency is displayed. Therefore the user can check whether  
15 it should be deleted and can easily delete it with safety to achieve the efficient use of the memory.

Further, it is preferable that the telephone numbers are sequentially displayed in increasing order of use frequency while the user checking. The user can easily select an unnecessary  
20 telephone number to delete it.

Preferably, the telephone includes an input device.

## BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a block diagram showing a radio mobile telephone according to an embodiment of the present invention;

Fig. 2A is a schematic diagram showing an example of the contents of a number area in a telephone number memory in Fig. 1;

Fig. 2B is a schematic diagram showing an example of the contents of a frequency area in the telephone number memory in Fig. 1;

Fig. 2C is a schematic diagram showing an example of the contents of a sorted data area in the telephone number memory in Fig. 1; and

Fig. 3 is a flowchart showing a telephone-number deleting operation according to the embodiment.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to Fig. 1, there is shown a mobile telephone in accordance with the present invention. The mobile telephone is

provided with a radio system 101 which transmits and receives a radio signal to and from a radio base station (not shown). The mobile telephone is provided with a processor 102, which is a program-controlled processor such as a central processing unit (CPU). A control program for the mobile telephone is stored in a read-only memory (ROM) 103 and runs on the processor 102 to control all operations of the mobile telephone including transmission and reception operations and a telephone number deleting operation as described later.

The mobile telephone is further provided with a telephone number memory 104 storing a plurality of telephone numbers which can be accessed by the processor 102. A keypad 105 is used by the user to do various operations such as registering of a new telephone number, displaying of a telephone number, and deletion of a selected telephone number. Necessary information is displayed on a display 106 such as a liquid-crystal display (LCD).

The telephone number memory 104 includes a telephone number storing area 201, a frequency storing area 202 for storing the number of times each telephone number has been repeatedly used, and a sorted data area 203 for storing telephone numbers which are sorted on decreasing order of frequency. According to a deleting instruction from the user, the processor 102 refers to the sorted data area 203 to display the telephone numbers to be deleted on decreasing order of frequency on screen of the display 106.

Referring to Figs. 2A-2C, it is assumed that the telephone number storing area 201 stores a total of 500 telephone numbers numbered REF.0 through REF.499. In Fig. 2A, for example, dialing information consisting of name "John" and telephone number "1234567890" is stored in a location of reference number REF.0 and dialing information consisting of name "Peach Boy" and telephone number "1111111111" is stored in a location of reference number REF.499. When a telephone number is used, that is, calling or called at or from that telephone number, the processor 102 increments a counter stored in a frequency storing area 202 for that telephone number. In this manner, the number of times each telephone number has been used is stored to the frequency storing area 202 for the corresponding reference number as shown in Fig. 2B. Here, the telephone number of REF.0 has been used five times, that of REF.1 two times, that of REF.2 has never been used, and that of REF.499 twenty times.

The processor 102 sorts the frequency data of the 500 telephone numbers in decreasing order of frequency to store the sorted data onto the sorted data area 203. The sorted data area 203 is updated when the user makes a call or when the user instructs the sorting by operating the keypad 105.

As shown in Fig. 2c, the sorted data area 203 stores the reference numbers of the 500 telephone numbers in decreasing order of frequency. Therefore, as described hereafter, according to the user's instruction, the processor 102 accesses

and reads a telephone number having the lowest frequency by referring to the sorted data area 203 and controls the display 106 to display the telephone number with the lowest frequency on screen.

5           Referring to Fig. 3, the processor 102 checks whether the telephone number memory 104 is full (step S301) and, if it is full (YES in step S301), the processor 102 reads the telephone number having the smallest frequency from the telephone number memory 104 by referring to the sorted data area 203 (step S302).  
10   The read telephone number and its information such as the name are displayed on the display 106 (step S303).

          The user confirms the telephone number to be deleted on the display 106 and, if it is to be deleted, depresses an enter key to delete it from the telephone number memory 104. When the  
15   user wants to hold that telephone number (NO in step S304), the processor 102 selects another telephone number with the second lowest frequency (step S305) and then it is displayed on screen (step S303). In this manner, the steps S303-S305 are repeatedly performed while selecting a telephone number with next higher  
20   frequency to display it on screen until a telephone number to be deleted has been found.

          When a telephone number to be deleted has been found, the user depresses the enter key (YES in step S304), which causes the selected telephone number to be deleted from the telephone  
25   number memory 104 (step S306). Such a deletion procedure

(S303-S306) can be repeated by a user's instruction (step S307).

5 As described above, when there is not enough memory to store a new telephone number onto the telephone number memory 104, the stored telephone numbers are displayed in increasing order of frequency while the user is checking whether it should be deleted. Therefore, the user can easily delete a telephone number with lower frequency with  
10 safety to achieve the efficient use of the telephone number memory 104.

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other  
15 disclosed and/or illustrated features.

Statements in this specification of the "objects of the invention" relate to preferred embodiments of the invention, but not necessarily to all embodiments of the invention falling within the claims.

20 The description of the invention with reference to the drawings is by way of example only.

The text of the abstract filed herewith is repeated here as part of the specification.

In a mobile telephone, a plurality of telephone  
25 numbers and use frequency of each telephone number are stored in a telephone number memory. When the memory is full, a telephone number with the lowest use frequency is displayed to be checked whether it should be deleted. Therefore the user can easily delete it with safety to  
30 achieve the efficient use of the memory.

**CLAIMS**

1. A mobile telephone comprising:  
a display;  
a memory for storing a plurality of telephone numbers  
5 and a frequency of use of each of the telephone numbers;  
and  
a controller for controlling the display such that,  
when the memory is full, a telephone number with the lowest  
frequency of use is displayed on the display.
- 10 2. A mobile telephone according to claim 1, wherein  
the controller increments the stored use frequency of a  
telephone number when calling that telephone number.
3. A mobile telephone according to claim 1 or 2,  
wherein the controller increments the stored use frequency  
15 of a telephone number when called from that telephone  
number.
4. A mobile telephone according to any preceding  
claim, wherein the controller sorts the stored telephone  
numbers in increasing order of stored use frequency and  
20 stores sorted data in the memory in response to a user's  
instruction.
5. A mobile telephone according to any preceding  
claim, wherein the controller deletes the telephone number  
with the lowest stored use frequency in response to a  
25 user's deletion instruction.
6. A mobile telephone according to claim 5, wherein  
the controller displays another telephone number with a  
higher use frequency when the telephone number with the  
lowest use frequency has not been deleted.

7. A method of controlling a mobile telephone, comprising the steps of:

5 storing a plurality of telephone numbers and a frequency of use of each of the telephone numbers in a memory; and

displaying a telephone number with the lowest frequency of use when the memory is full.

10 8. A method according to claim 7, wherein the stored use frequency of a telephone number is incremented when calling that telephone number.

9. A method according to claim 7 or 8, wherein the stored use frequency of a telephone number is incremented when called from that telephone number.

15 10. A method according to any of claims 7 to 9, wherein the telephone numbers are sorted in increasing order of use frequency and sorted data is stored in the memory in response to a user's instruction.

20 11. A method according to any of claims 7 to 10, further comprising the step of:  
deleting the telephone number with the lowest stored use frequency in response to a user's deletion instruction.

25 12. A method according to claim 11, further comprising the step of:  
displaying another telephone number with a higher stored use frequency when the telephone number with the lowest use frequency has not been deleted.

30 13. A mobile telephone substantially as herein described with reference to and as shown in Figure 1 of the accompanying drawings.

14. A method of controlling a mobile telephone substantially as herein described with reference to Figure 3 of the accompanying drawings.



Application No: GB 9915099.7  
Claims searched: 1 to 14

Examiner: Jared Stokes  
Date of search: 21 December 1999

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## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): H4K (KBNJ)  
H4L (LECX)

Int Cl (Ed.6): H04M (1/274)

Other: On-Line - WPI, EPODOC, JAPIO

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
Y	GB 2 322 511 A (Nokia) See page 7 lines 11-15	6,12
X,Y	WO 98/27706 A1 (Northern) See page 15 lines 4-15, page 20 lines 13-19	X: 1-5, 7-11 Y: 6,12

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.